

- 1 1. A water-borne polymeric complex comprising:
2 a strand of a π -conjugated polymer having cationic charges thereon; and
3 a strand of a polymer having balanced hydrophobic/hydrophilic regions and
4 anionic charges thereon that is non-covalently bonded to the π -conjugated polymer to
5 form a polymeric adduct;
6 the π -conjugated polymers selected from the group consisting of polyaniline,
7 polypyrrole, polythiophene, poly(phenylene sulfide), poly(p-phenylene), poly(phenylene
8 vinylene), poly(furylene vinylene), poly(carbazole), poly(thienylene vinylene),
9 polyacetylene, and poly(isothianaphthene);
10 the polymer selected from the group consisting of poly(acrylic acid),
11 poly(methacrylic acid), poly(vinylmethylether-co-maleic acid),
12 poly(methylmethacrylate-co-acrylic acid), poly(ethylmethacrylate-co-acrylic acid) and
13 poly(acrylamide-co-acrylic acid), the bonded strands are configured in a double-stranded
14 polymeric complex, the hydrophobic/hydrophilic regions resulting in a latex like
15 dispersion of the complex in water, the polymeric complex characterized by being water
16 soluble before it is coated on a surface and water insoluble after it has been coated on the
17 surface.
- 1 2. The complex of claim 1 wherein the balanced hydrophobic/hydrophilic
2 regions comprise a polymer that has both anionic and cationic functional groups.
- 1 3. The complex of claim 2 wherein the π -conjugated polymer is polyaniline and
2 the polymer is poly(methylmethacrylate-coacrylic acid).
- 1 4. The complex of claim 3 wherein the cationic groups are methacrylate
2 segments and the anionic groups are acrylic acid segments.
- 1 5. The complex of claim 1 wherein the π -conjugated polymer is polyaniline and
2 the polymer is poly(acrylic acid).
- 1 6. The complex of claim 1 wherein the π -conjugated polymer is polyaniline and
2 the polymer is poly(vinylmethylether-co-acrylic acid) and the polymer adduct is folded
3 with the hydrophobic regions folded inside and the hydrophilic strands interfacing with

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4 the water.

1 7. An anti-corrosive composition which comprises:
2 the complex of claim 1 combined with a coating composition.

1 8. The composition of claim 7 wherein the coating composition is selected from
2 the group consisting of thermoset or thermoplastic resins.

1 9. The composition of claim 8 wherein the resins are selected from the group
2 consisting of epoxy, acrylic, alkyd, vinyl, urethane or olefinic resins.

1 10. The composition of claim 7 wherein the coating composition is an epoxy
2 and the composition further comprises:
3 a curing agent selected from the group consisting of capped polyamines,
4 polymercaptans, polyisocyanates.

1 11. The composition of claim 7 wherein the coating composition is an epoxy
2 resin and which comprises a curing agent selected from the group consisting of
3 polycarboxylic acids, polyanhydrides, polyphenols and carboxy-functional polyesters.

1 12. The composition of claims 9 or 10 wherein the epoxy is a cationic epoxy
2 resin.

1 13. The composition of claim 10 wherein the polymeric complex is crosslinked
2 to the epoxy resin.

1 14. A method for forming a water-borne polymeric complex comprising:
2 placing a strand of a π -conjugated polymer having cationic charges thereon in a
3 medium; and
4 adding a strand of a polymer having balanced hydrophobic/hydrophilic regions
5 and anionic charges thereon to bond to the π -conjugated polymer to form a polymeric
6 adduct;
7 the π -conjugated polymers selected from the group consisting of polyaniline,

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8 polypyrrole, polythiophene, poly(phenylene sulfide), poly(p-phenylene),
9 poly(phenylene vinylene), poly(furylene vinylene), poly(carbazole), poly(thienylene
10 vinylene), polyacetylene, and poly(isothianaphthene);

11 the polymer selected from the group consisting of poly(acrylic acid),
12 poly(methacrylic acid), poly(vinylmethylether-co-maleic acid),
13 poly(methylmethacrylate-co-acrylic acid), poly(ethylmethacrylate-co-acrylic acid) and
14 poly(acrylamide-co-acrylic acid), the bonded strands are configured in a double-
15 stranded polymeric complex;

16 controlling the balance of the hydrophobic/hydrophilic regions to form a latex
17 like dispersion of the complex in water, the polymeric complex characterized by being
18 water soluble before it is coated on a surface and water insoluble after it has been
19 coated on the surface.

1 15. The complex of claim 14 wherein the balanced hydrophobic/hydrophilic
2 regions comprise a polymer that has both anionic and cationic functional groups.

1 16. The complex of claim 15 wherein the π -conjugated polymer is polyaniline
2 and the polymer is poly(methylmethacrylate-coacrylic acid).

1 17. The complex of claim 16 wherein the cationic groups are methacrylate
2 segments and the anionic groups are acrylic acid segments.

1 18. The complex of claim 14 wherein the π -conjugated polymer is polyaniline
2 and the polymer is poly(acrylic acid).

1 19. The complex of claim 14 wherein the π -conjugated polymer is polyaniline
2 and the polymer is poly(vinylmethylether-co-acrylic acid) and which comprises
3 controlling the formation of the polymer adduct to fold the adduct with the hydrophobic
4 regions folded inside and the hydrophilic strands interfacing with the water.

1 20. A method for the formation of an anti-corrosive composition which
2 comprises:

3 combining the complex of claim 1 with a coating composition.

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1 21. The method of claim 20 wherein the coating composition is selected from
2 the group consisting of thermoset or thermoplastic resins.

1 22. The method of claim 21 wherein the resins are selected from the group
2 consisting of epoxy, acrylic, alkyd, vinyl, urethane or olefinic resins.

1 23. The method of claim 20 wherein the coating composition is an epoxy and
2 the composition further comprises:

3 adding a curing agent selected from the group consisting of capped polyamines,
4 polymercaptans, polyisocyanates to the composition.

1 24. The method of claim 20 wherein the coating composition is an epoxy resin
2 and which comprises:

3 adding a curing agent selected from the group consisting of polycarboxylic
4 acids, polyanhydrides, polyphenols and carboxy-functional polyesters to the
5 composition.

1 25. The method of claims 22 or 23 wherein the epoxy is a cationic epoxy resin.

1 26. The method of claim 14 which polymeric complex is crosslinked to the
2 epoxy resin.

3 27. The method of claim 20 which comprises:

4 forming a protective coating on a metal surface by dispersing the polymeric
5 complex in water;

6 binding a cationic epoxy resin to the polymeric complex to form a cathodically
7 charged coating solution; and

8 electrophoretically coating a metal with the cathodically charged solution.

1 28. The method of claim 27 wherein the metal is aluminum.

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